S S 358 S

GENERAL INFORMATION

AUGUST 1962

Soil Conservation

SOIL CONSERVATION SERVICE • U. S. DEPARTMENT OF AGRICULTURE

VOL. XXVIII, NO. 1 AUGUST 1962

US.8 S58S
v.28 Aug. 1962-July 1963

CONTENTS

PAGE

3 Conservation Is International
By Donald A. Williams

4 Soil Conservation Around the World
by Phoebe Harrison

6 Key Conservation To Worldwide Peace Hope
By R. W. Sanders

7 Training For Conservation In Many Lands
By J. B. Rogers and Lee B. Shields

9 Yugoslavians Take Home Conservation Findings
By Sellers G. Archer

10 Education and Skills Key To World Resources
By Gladwin Young

12 Spain's Conservation Program
By R. M. Elizalde

14 Soil Surveys Basic Throughout the World
By Charles E. Kellogg

16 They Learn About Conservation and Americans
By Jackson Bennett

17 Soil Conservation Sticks in Taiwan and Burma
By Ira K. Landon

19 3 Ways To Conservation
By William R. Van Dersal

21 Golden Rain Tree Goes To College
By Melvin M. Thompson

22 Snow Surveys In West Pakistan
By John E. Priest

23 Book Review

24 World Food Forum

Growth Through Agricultural Progress

Soil Conservation 25 Years Ago

"When the Spanish conquerors ascended the lofty ranges of Peru, the Incas were practicing a highly effective system of soil and water conservation by skillfully building soil-holding walled terraces along the precipitous mountain slopes and applying to the crops grown on these contoured shelves water brought from nearby and remote places through ditches and tunnels. The soil thus held in place has been safely cultivated across the centuries. Many of the terraces that were in use when Pizarro overthrew the great southern civilization are still being farmed. And, in the Philippines, the head-hunters of the mountain ranges were similarly utilizing and conserving soil and water when the Spanish entered that part of the Orient."

•

"Controlling erosion on agricultural land is the major problem of the Service and is given preference in all cases."

COVER PICTURE — This completely healed gully and the pond for livestock and irrigation water are part of effective conservation work at Marlborough, South Island, New Zealand. (Soil Conservation and Rivers Control Council photo.)

Soil Conservation

ORVILLE L. FREEMAN
Secretary of Agriculture

DONALD A. WILLIAMS
Administrator, Soil Conservation Service

SOIL CONSERVATION is the official organ of the Soil Conservation Service, published by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business. The printing of this publication was approved by the Bureau of the Budget, June 26, 1958.

FRANK B. HARPER, Editor

15 CENTS PER COPY $1.50 PER YEAR

FOREIGN—$2.25 PER YEAR

25 percent discount on orders of 100 or more mailed to one address.

All orders for paid subscriptions go to the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

TS

Conservation Is International

By Donald A. Williams

ONE of the United States' most important agricultural exports today is soil and water conservation information and technology. It is not a commodity that shows up in our trade balances; but it is nonetheless real and substantial worldwide.

We also import a certain amount of conservation information and materials from some other countries which have moved forward in this field; but the "balance of trade" understandably is in our favor, as the Nation that has devoted more of its agricultural scientific energies to the development of soil and water conservation and has spent more money in applying conservation measures on the land than has any other. The resulting abundance of exportable conservation knowledge has been made possible by cooperative local, State, and Federal research and technical action programs, and the outlay of private funds.

Problems of soil erosion, land misuse, and water waste are not contained by national boundaries any more than they are limited by farm fence lines or by county, State, or other political boundaries. They are worldwide. Everywhere but in deserts and frozen polar regions land is subject to erosion if it is not protected by vegetation.

Meanwhile, nearly all of the world's approximately 15 billion acres of agricultural land needs some degree of protection against erosion. Controlling erosion is one of the most urgent problems facing the world's peoples in this day of rapidly growing populations and increasing pressures upon the land for production of food, fiber, and other crops to meet their needs.

Although floods, because they are spectacular and cause costly damage easily seen and measured, properly receive much attention anywhere, soil erosion should receive certainly no less attention. It decreases soil productivity and reduces water availability for crops, human needs, industrial and other essential uses, and can have serious effects upon the development and progress of any nation.

Fortunately, land studies and surveys being made in both the larger and more important agricultural regions and in small and remote areas are showing the locations of areas needing soil and water conservation treatment. Made through national conservation programs, these surveys point up what and where the land problems are. Generally, such studies also have shown that when the people of a community, a state or province, or a country as a whole understand the extent and economic significance of their land problems, they want to undertake programs to remedy them.

A continuing reminder of the growing trend in this respect is to be found in the agriculturists who come to the United States each year to observe soil and water conservation work in areas having similar conditions to their own, and to learn as much as they can about modern conservation techniques. They also study administrative organization and procedures for putting those techniques into practice at home. Others similarly visit other countries in which conservation programs are under way, especially those countries having more closely related problems.

And there are some outstanding soil and water conservation programs of national extent that already are proving their effectiveness in stabilizing and safeguarding the agriculture of the countries that have them. Also, a cooperative "international" movement for soil erosion control is beginning; that is, through cooperative conservation operations between neighboring countries likely to have similar problems of wind or water erosion. They, too, of course, need technicians trained in the use of conservation practices.

In all cases, the Soil Conservation Service looks upon any contributions it can make to such training, and to the furthering of conservation programs in any way its facilities permit and where opportunities for service in fact exist, as a highly important obligation.

I was made especially conscious of the importance of doing so when I spent several weeks in India, at the request of the Indian government, to make recommendations for strengthening its soil and water conservation program started in recent years. Modern India is among those countries that are trying to deal with land-use and related problems, and to establish new patterns of resource use that more nearly will meet the needs of their people. I considered it a privilege to have been asked to help the Indian government in its search for those new patterns.

Wherever it may be, whether in India or in the United States, there is unending need to be forward-looking in all works concerned with the conservation of soil and water or other natural resources. It is encouraging, heartening, to know that this attitude, increasingly supported by action programs, is spreading at an ever-faster rate around the world.

Soil Conservation Around the World

By Phoebe Harrison

IT probably is safe to say that practices to protect the soil's productivity are being sought by some of the people in all countries today and that they are being used to advantage in varying degrees in the great majority of countries.

The largest areas being treated for soil and water conservation each year include United States farm and ranch land. Then come the agricultural states of Australia, New Zealand, the Rhodesian Federation, and the Republic of South Africa, all of which have firmly established programs, and Mexico and large areas in nearly every Central and South American country.

Much progress is being made in countries bordering the Mediterranean, especially in Spain, Italy, Greece, Israel and Jordan, Turkey, and Libya and Algeria merging into the Sahara.

The first recorded formal soil conservation programs outside of the United States were initiated in 1936 in the three prairie provinces of Canada—Saskatchewan, Alberta, and Manitoba—and in Kenya, East Africa. They and countries that have undertaken programs in the ensuing years have drawn liberally upon research, educational, and technical information from the United States. Many have received help from Soil Conservation Service technicians detailed to them through "Point Four" and other technical assistance programs, or have sent their own agriculturists to this country to study our conservation methods and administrative procedures.

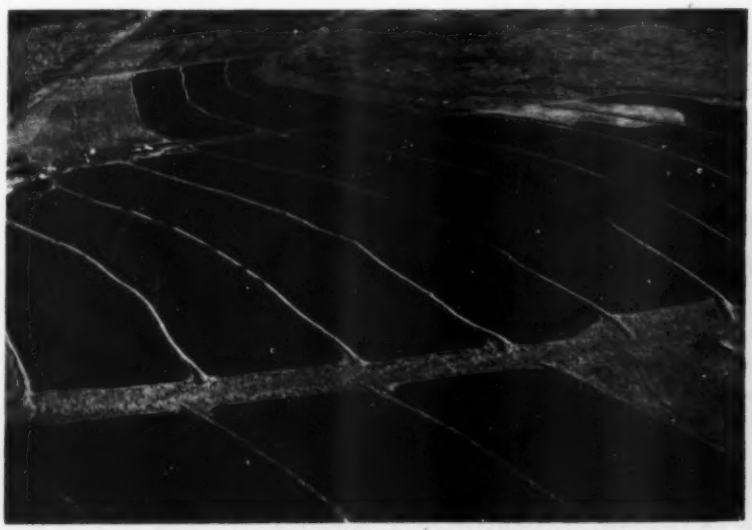
Soil conservation district programs are in operation today in no fewer than 20 other countries; and requests continue to be received for district model legislation and regulations from countries planning to broaden their conservation programs. They are patterned after those which have been operated so effectively by farmers and ranchers in the United States since 1937. In most countries, however, the conservation programs first have had to go through the initial educational and demonstration-project stage similar to that which preceded our own extensive districts program.

The Philippine Republic is a leader in soil conservation among Pacific region nations; and so is Malagasy, the newly made republic occupying the island long called Madagasgar. Its program provides an interesting example of how the idea of soil conservation can be retained in transformation of a country from colonial status to a republic.

The U.S.S.R. incorporates some soil and water conservation practices in connection with state and collective farm programs, and also in reclamation projects and programs for development of wild or new lands. In north central continental China, a vast plan for river management, combined with irrigation and use of soil conservation on land between the streams, is under way.

Runoff control structures in Andes region of Venezuela.

Modern soil conservation prac-



Contour farming in Clifton district of Queensland's Darling Downs.

Note:—The author is information specialist, Soil Conservation Service, Washington, D. C.

tices are beginning to take hold in several European countries above the Mediterranean tier. Yugoslavia has an active program; and some significant soil and water conservation research is being done in Poland.

Good land use, and some erosion-control methods long have, from

Typical farmer meeting held by Soil Conservation Division near São Paulo, Brazil.

necessity, been used to maintain the agricultural base of these middle countries of Europe. Modernization of erosion-control practices is helping to raise productivity on a sustained basis in several regions.

Among Asian countries, India and Pakistan, and Nationalist China on the Island of Taiwan, have established soil and water conservation programs that have the authority and backing of their governments.

Greater yields from the acre, hectare, morgen, donum, or whatever unit is used for measuring land, undoubtedly is the main incentive that keeps soil conservation spreading and makes programs to improve the land "stick," sometimes under great difficulties. New Zealand reported a 90 percent increase in grassland-carrying capacity for cattle by means of soil conservation, and a 75 percent increase for sheep. Doubled and tripled yields of food and pasture crops are reported by the departments of soil conservation of Mexico, Venezuela, Colombia, and Sao Paulo State in southern Brazil, the Republic of South Africa, Rhodesia, and three Australian states. Yield increases already are apparent in Spain, with one of the world's newest programs.

Another significant feature of today's interest in conservation around the world is an increase in surveys that are being made in many countries to determine their conservation needs. Some remarkably painstaking land studies and surveys have been completed in recent years, including the United States' own National Conservation Needs Inventory, to show the exact locations of areas needing different soil and water conservation treatments and projects. This important conservation activity is happening not only in some of the world's largest and most important agricultural regions but also in small and remote areas where no such surveys were ever made before.

Surveys of this kind are being given special attention in New Zealand, Australia, the Philippines, Canada, Mexico, South Africa and the Rhodesia-Nyassaland Federation, and in Spain, Portugal's overseas colonies, France, and Israel. They show in great detail where conservation projects should be concentrated. They are made through national soil conservation programs and with national funds. They fill a need of long standing, and are expected to point the way toward economical and efficient handling of land problems in the future.

Vineyard plantation on contour in Israel's Jeze'el Valley.

SCS MEN LEARN FRENCH

Two Vermont Soil Conservation Service technicians took a course in conversational French in order to be able to discuss farm planning with the growing number of French farmers in Orlean County in their own language. Roger Beadle, work unit conservationist, Newport, Vt., who took the course with Herbert Dunbar, conservation aid, Barton, under Prof. Jean Goulet of Sherbrooke University of Sherbrooke, Quebec, spoke for both when he said: "I think I now could go out with any French farmer and gather enough information to develop his conservation plan or work with him in any phase of planning or application."

Keys Key Conservation

To Worldwide Peace Hope

By R. W. Sanders

THE C. P. Keys of South Carolina would have the people of the United States look to India for a lesson in frugality in handling their land and other basic resources .

Not only did the Keys, of Lodge, spend 6 weeks in India in 1961, but they afterward had Hanu Hanumanthappa of Bangalore, India, spend 3 weeks with them. He came to the United States for a year to go to school at the University of Tennessee. He was one of three visitors from other countries in the Key home in recent years. The others were from Germany and Finland. But India clearly is Key's first interest abroad conservationwise.

"In India," he pointed out, "they put every single thing to use. Even thorny bushes are used to weave fences. They don't cut trees down, they dig them up. One reason for this is they want the stump out of the way. But another reason is that they want the roots for fuel. The twigs and limbs are also used for fuel or for making plow stocks. They waste nothing."

Indian Visitor Hanumanthappa said:

Building narrow-based contour bund by hand labor in India.

"If we could double our agricultural production, we would not have a surplus. Our population is increasing at the rate of 2 percent a year. Then, too, India is being flooded with people who are fleeing bordering countries."

Speaking from his wide experience, Key noted that there is only .8 of an acre of cropland per person in India. We have nearly 3 acres per person in the United States. India has a longer growing season, however, and can grow four crops of rice or vegetables a year, because of the 12-month growing season.

"We can't change our growing season," Key said. "Then, too, population is increasing here. After seeing those things that I have seen in other countries, I have given more thought to the things we have in our own country. We are inclined to take fertile soil and other blessings for granted. Even though our population is increasing, we give utter disregard to putting good agricultural land to other uses such as housing developments, super highways, and industrial sites."

Key believes some way must be found to make our own people appreciate the natural resources we take for granted, lest our children or grandchildren experience scarcity.

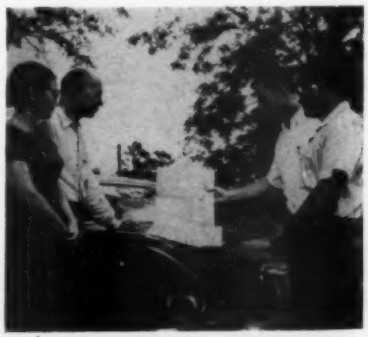
"Of course, we have a surplus problem now in respect to some commodities, but farm production can't be turned on and off like a faucet," he said. "I have complained about surpluses, but I won't ever do that again. We need to take a longtime point of view. There is no more land to be purchased for 3 cents an acre as was done in the case of the Louisiana Territory in 1803."

"And," as Key sees it, "we have just scratched the surface in realizing the potential of drainage, watershed protection and flood prevention, irrigation, and other agricultural water management."

"The two things most essential for world peace are food and education," Key believes. "From these would come improvement in standard of living and general welfare. These are more conducive to peace than are hunger, poverty, and ignorance."

Key believes modern soil, water, woodland, and wildlife conservation methods as practiced in this country could vastly help other nations. This view is based upon experience on his own farm, as a supervisor of the Colleton Soil Conservation District, and upon the observations he made in India.

He believes that agricultural production could be doubled in India if soil surveys were available, and conservation practices



Hanus Hanumanthappa of Bangalore, India, (right) listens as SCS Technician Robert W. Sanders discusses conservation plan with the Keys (left.)

Note:—The author is work unit conservationist, Soil Conservation Service, Walterboro, S. C.

were plannned and applied in keeping with the capability of the land. Also, he thinks technical help similar to that provided by Soil Conservation Service technicians is needed.

This is Key's formula: Natural resources, plus culture, divided by population, equals standard of living. He points out that the plight of some nations is that they have more people than land. In some cases culture is an important factor. He thinks that conservation and wise use of natural resources and better education of people throughout the world can be instruments of world peace.

Training For Conservation IN MANY LANDS

By J. B. Rogers and Lee B. Shields

SOIL and water conservation problems reach around the world—and so do cooperative activities of the Soil Conservation Service for helping solve those problems in other lands.

In line with the Department of Agriculture's goal of world agricultural cooperation, the facilities of the Soil Conservation Service are at the disposal of other nations for help in setting up programs to help them conserve their own soil and water resources.

The Service regularly participates in training programs in this country for persons concerned with other countries' agricultural activities. During 1961, for example, the Service assisted other cooperating agencies in developing training programs for 313 individuals from 49 countries. These trainees spent approximately 6,389 mandays, or an average of about 20 working days each, with SCS technicians around the country studying all phases of our soil and water conservation program. Included among this number were 9 Agency for International Development employees on home leave to receive "Refresher Training." Also included were 15 teams of from 5 to 20 individuals. Of the 49 countries represented, India and Turkey had the most trainees, 13 each, followed by Thailand, with 11.

Although it is impracticable to find locations in the United States where climate, rainfall, topography, and agronomic conditions coincide exactly with those of his home country, the Service tries to locate each trainee where practices are carried out that easily may be be adapted to conditions at home. The SCS also assists in developing programs for those who desire training in some specific phase of soil conservation—by assignment to our cartographic units, engineering and watershed planning units, training centers, nurseries, and other field offices.

The trainees return home with a better understanding of the work being done in the United States to preserve and enhance our soil and water resources, and with the technical knowledge needed to adapt that work to conditions in their own countries. The Service has received many reports from visitors and from its own personnel, indicating successful accomplishment of these assignments. These excerpts from a few of them tell the story:

A Brazilian trainee wrote of the training of 8 district teams to map and plan farms, and to design needed conservation features. In carrying out this training, these teams gave actual assistance to nearly 100 farmers.

Trainees study soils problem on farm near Fort Robinson (Nebr.) Training Center (l. to r.): Ali Kucukkoca, Turkey; Fakhir Jabber, Iraq; Halil Isik, Turkey; Sampop Chantaramanee, Thailand; Oentoeng Atmosoeparto, Indonesia (kneeling).

An Israeli trainee: "Our method of survey and planning has now been adapted entirely to your standards. Above all, we are now carrying out actual reclamation and conservation schemes on a fairly wide scale, instead of spending much of our limited time on consulations, as we used to do before. Since I have returned we have reclaimed approximately 2,500 acres of badly eroded land, . . ."

From two Sudanese participants: "We feel we have obtained a firm grip on some of the practical work of soil conservation . . . We say goodby—but our hearts will never say so."

An Indian trainee wrote:

"India's most critical problem probably is the conservation of rainfall, which is highly erratic

Note:—The authors are foreign service officer and Information Division staff member, respectively, both of the Soil Conservation Service, Washington, D. C.

throughout the country, and brings on famine conditions 2 years out of 5. During famine periods, the government must not only provide work for farmers, but must face the problem of food. That is why every piece of information I can gather here to alleviate the situation is so important for my country's welfare."

Thirty-nine SCS technicians are on assignment with AID in 22 foreign countries, training foreign "counterparts" in adapting conservation practices and "know-how" used in the United States to conditions in their own countries. Among them are soils advisers, food and agricultural officers, agricultural engineering advisers, soil conservationists, irrigation engineers, ground-water geology advisers, management specialists, information specialists, land-classification experts, soil scientists, range specialists, and agronomists.

When a need is established for conservation help on a specific practice or group of practices, the AID sends a man in this country who is in that particular field. He looks over the situation, determines what is needed and how best to install it, how to use the labor force available, and how to adapt his knowledge to conditions in the country. He then, with his counterpart, someone assigned by that country to learn how to adapt the practice, begins to apply the practice and trains his counterpart in adapting the practice to local conditions. Thus, when the American leaves, the counterpart is able to carry on and install the practice wherever it is needed without technical advice.

One good example of such help is that provided by Ralph S. Murphy, a former SCS technician in Texas, who spent the past 3 years as soils adviser at the AID mission in Korea. Murphy and other American technicians trained Koreans to analyze and classify soils. The first half of the training was conducted in the classroom, and the remaining time was spent in the field. Trainees learned to identify soil by its texture, and then to make a profile. The trained Koreans were sent, one to each province, to classify the soils as cropland, orchard land, or grass and forest land. Then the soil was analyzed and classified according to composition.

Murphy worked with the men in the field as much as possible, and, from the survey data, he was able to show Korean farmers how to make the best possible use of their land. In Korea, where highly productive land is scarce, the surveys showed that tracts considered useful only for forest land were as rich as those that were yielding crops in adjoining fields. After removing the trees and using fertilizers, this land was planted to productive apples, pears, persimmons, or other fruit.

Sandy loam soils which were producing poor crops were found useful for growing peanuts, melons, and sweet potatoes. Some land that had been producing poor crops or rice was found to be suitable for growing potatoes.

Nearly every country now has some kind of conservation program going. It not always is under that name—sometimes simply irrigation, drainage, or whatever the major problem is in that particular country. But the people are doing the work themselves, which is the important thing.

The Service, for example, is providing direct technical aid to Tunisia in development of a soil and water management program under auspices of AID. The project involves watershed planning and development in a pilot area of 100,000 hectares, (approximately 44,500 acres) where all applicable soil, water, and plant conservation and range management techniques can be applied in a planned sequence, where Tunisian technicians can be trained in conservation, and where a stable economy can be developed for the local population. The results will be applicable to some 5 million hectares of arid rangeland in Tunisia.

Food and Agriculture Organization visitors from 19 countries were in group touring Bornitz Creek watershed in Dewey County SCD near Clinton, Okla.: Argentina, Brazil, Burma, Chile, El Salvador, Honduras, India, Ceylon, Israel, Jamaica, Greece, Madagascar, New Zealand, Philippine Republic, Sudan, Pakistan, Thailand, Turkey, and Venezuela.

Yugoslavians Take Home Their Conservation Findings

By Sellers G. Archer

MODERN soil and water conservation principles and techniques are being advanced in Yugoslavia through the efforts of two visitors and observers of this work in the United States.

One is Mrs. Stevanija Sanovic of Titograd, Montenegro, one of the delegates to the World Congress of Foresters in Seattle in 1960. She wanted to become a school teacher, but when she enrolled in college, the only openings were in medicine and forestry. She didn't want to be a doctor; so she became a forester!

Her compatriot is Srboljub Dobrivojevic of Zvornik, director of the Yugoslavian agency, the Section for Torrent Control and Soil Preservation from Erosion, which is the equivalent of our Soil Conservation Service. He, with Mrs. Sanovic, spent 3 months studying soil conservation and forestry practices in the United States.

The Hotophia Creek watershed project at Batesville was one of the projects they studied during a 4-week tour of Mississippi conservation projects. They saw how trees, grass, and de-silting basins had controlled erosion on steep uplands. They studied more than 15,000 acres that had produced cotton until gullying and sheet erosion robbed the soil of its fertility, and now is planted to pine trees and pasture grasses. They saw how eroding roadsides, which once added to the large load of silt washed onto bottom lands and into stream channels, are being protected under the watershed program with grass and kudzu.

Dobrivojevic, the conservationist, said Yugoslavia has similar erosion problems and that similar conservation treatments are needed.

Flood prevention reservoirs being built above the fertile bottom lands in the valleys were new to the visitors. Soil Conservation Service men explained to the Yugoslavians that dams on the principal tributaries of the Hotophia watershed retain normal reservoirs of water that may be used by landowners for irrigation or other purposes. They were intrigued with the design providing for flood pools, kept empty until floods come, with floodwater that builds up behind the dams then released slowly enough that the steam channels below will not overflow.

Visiting Conservationist Dobrivojevic was enthusiastic about the American program which treats "torrent control," or flood prevention, and soil erosion control as one basic watershed program.

As the Yugoslavians visited the many works of improvement being established on the watershed, they talked variously of the friendliness of the American people, of their country, and of American economic aid.

Mrs. Sanovic said the newspapers in her country carry complete reports of all aid given by the United States. All the people know that the United States is their friend, she emphasized; and she declared her intention of carrying a good report of America, the American people—and soil and water conservation—back to her countrymen.

Note:—The author is field information specialist, Soil Conservation Service, Spartanburg, S. C.

Mrs. Sanovic and Dobrivojevic being shown kudzu roadbank planting by Soil Conservationist W. D. Gordon.

Here they inspect area on which erosion is controlled with pine trees and African lovegrass.

◆

People in the United States spend about 20 percent of their disposable incomes for food, Japanese about 42 percent, West Germans 45 percent, and Russians 56 percent.

◆

The U. S. is the largest exporter of farm products in the world. These exports totaled a record $5,030,000,000 in 1961.

Education and Skills Key To World Resources—Food Development

By Gladwin Young

THE greatest difference between food scarcity and abundance over the world lies in the state of development of minds and skills rather than in differences in the potential productivity of land. This conclusion was confirmed on a tour in 8 countries of Southern Asia in October 1961 by Secretary of Agriculture Orville L. Freeman and 12 U.S. Department of Agriculture administrative and technical staff members to evaluate progress in agricultural development and the United States' assistance program in that part of the world.

The author's assignment was to observe progress in soil and water resource development in these developing nations—Iran, Pakistan (both East and West), India, Burma, Thailand, Indonesia, the Philippines, and Japan. It was impossible to do more than gain general impressions in the 2- or 3-day visit to each country. But by the end of 30 days and visits to 8 countries, no one could possibly overlook the fact that the pursuit of "daily bread" still occupies the energies of more people in the world than all other pursuits of man combined.

In Iran, Indonesia, and Pakistan, with a combined population of 203 million, 80 percent of the people live on the land. In India, with 438 million people, 72 percent live on the land. Even with all this human energy directed toward agriculture, there is not enough food for present populations, and certainly the outlook for matching increased food production against the present 2½ percent annual rate of population increase is far from encouraging.

In contrast, less than 9 percent of the population of the United States is on farms; yet it feeds abundantly the rest of our 187 million people. But it was not always thus even in America.

When white men first came to this continent, there were fewer than a million American Indians; but, with a whole continent of virgin fertility at their disposal, they still were poorly fed, clothed, and housed. Now, our growing millions live with abundance from the same soil and water resources. The difference lies in what educated minds and scientific skills were able to do with available resources in contrast to what had been achieved with uneducated minds and primitive skills.

Primitive customs and traditions in existence for centuries still exist in underdeveloped countries. Any change, however promising to informed minds, is beyond reasonable risk for minds that comprehend only primitive skills and arts.

In brilliant contrast to the underdeveloped countries of South Asia, Japan is a thriving, well-developed nation. The ability of this country, not only to feed itself abundantly but also to provide itself with a high standard of living, is one of the greatest human success stories in the world.

What has made the difference? Is it land resources? Obviously not, because Japan has less than 1/7 acre of arable land per capita in contrast to .84 in India, .65 in

Land leveling is important for dryland water management and erosion control as well as in rice paddies in India.

Note:—The author is deputy administrator, Soil Conservation Service, Washington, D.C.

Pakistan, and ½ acre in Indonesia.

Could education make the difference? Japan has less than 1 percent illiteracy, compared to more than 80 percent illiteracy in India and Pakistan and 41 percent in Indonesia—even higher among farm people. Japan started universal public schools almost 200 years ago. Many of the underdeveloped countries are just now making a start.

No nation can expect to progress beyond bare subsistence with illiterate and unskilled people on the land. A veneer of a few highly educated people superimposed on illiterate masses cannot develop a nation. In Iran, we visited a new agricultural college with an enrollment of 500 students. Not one of these students was a farmer's son. In the farm villages, there was no school system that would in time fill that college with bright minds with a zeal for problem solving of the kind that would be meaningful to their own village people.

Lack of education has not been the only limiting factor to development of land and water resources in underdeveloped countries. Other factors pointed out to us by experienced persons included need for land reforms, farm credit, transportation, cooperatives, and markets, plus the fact that throughout history farmers have occupied a low position in the social and economic structure.

Take one 35-year-old rice farmer in Thailand, to illustrate: He produces one crop of rice from 1 hectare, or less than 2½ acres. For 5 months he has nothing else to do. He has never been to school; neither has his wife nor their five sons. He had never used fertilizer, though he had seen it used on a demonstration farm. He said it increased yields about 50 percent but that he couldn't afford to borrow money to use it. There was no agricultural credit available and no regulation on lenders or interest rates. He was already in debt and was paying 80 percent interest, with little chance of ever becoming debt free.

It is in this kind of deficient institutional and governmental setting that many of the technical experts from the United States

Small tractors and adapted farm equipment are replacing water buffalo and stick plow in Japan.

Secretary Freeman chats with camel driver near Agra, India through interpreter at the left.

are trying to help these and other nations increase their food production. In spite of these handicaps, many of these specialists are giving real and fundamental help to speed up the rate of agricultural improvements.

In each of the eight countries visited we found men on leave from the Soil Conservation Service and former SCS employees all making outstanding contributions, at great personal sarifices. Their service is not as glamorous as that of astronauts who orbit the earth, but may in fact be more significant in our search for world peace. As Secretary Freeman said in Bangkok.

"Without in any way detracting from the importance of outer space, I should like to point out that to hundreds of millions of people on earth, rice and bread on the table are more important than a satellite in the sky."

It seems obvious that increased production to feed the world's expanding population in the foreseeable future must come, and can come, from developing the soil and water resources already in use by hundreds of millions of cultivators. There is enough known technology in the world to meet these food demands. The problem is to change from existing primitive methods to the application of these known technologies. The knowledge and skills that have made American agriculture so productive and efficient are already at work around the world.

Worldwide Conservation Readers

A significant reflection of the worldwide interest in the pioneering American brand of soil and water conservation is the growing readership of such literature as SOIL CONSERVATION magazine among agricultural and other people abroad. Sixty-nine countries now are represented on the subscription list.

India leads, followed by Canada, South Africa, Japan, Australia, and the U.S.S.R.

Meanwhile, the Washington office of the Soil Conservation Service has become one of the principal locations in the world for the collection and preservation of conservation literature from different countries. After use or screening by the Service, all the publications that merit keeping, are retained by the U.S. Department of Agriculture Library.

Spain's Conservation Pro

By I.

SINCE 1955 Spain has been on the warpath against erosion. Six months after the law creating the Soil Conservation Service was enacted plans were drawn up involving conservation measures on 250,000 acres. Within 2 years, 25 percent of the projects were carried out; and, at the end of 1961, 375,000 acres had been put under conservation treatment. At present there are conservation projects on a million acres comprising different soils in 16 of Spain's eroded provinces.

Although Spain is carrying on a tremendous conservation drive, hardly anyone is aware of it. Conservation, as almost anywhere else in the world, is a confusing term with which few are familiar. In Spanish-speaking countries it is often mistaken with "canning" ("industria de conservas"), with which it has very indirect relationships to be sure; but, call it as one may, the truth is that conservation is on the go in Spain.

It is fast converting conservation-conscious farmers, because improvement on isolated "pilot" farms are so obvious that many farmers are beginning to take notice and are getting ready to follow the example.

Spain has a total farming area of 83,000,000 acres, 95 percent of which are dry lands. Agricultural engineers specializing in conservation consider that out of this total, 16 percent of the soils are practically unaffected by erosion, 44 percent moderately; 29 percent have advanced erosion and 11 percent severe erosion. In the latter estimate, .6 percent are in swamps or marshlands suitable for wildlife.

A week after the late Hon. Rafael Cavestany, the Spanish Hugh Bennett, made his memorable speech at the Cortes on July 14, 1955, when he was Minister of Agriculture, and made his plea for conservation, the law was unanimously passed. Spain had officially signed its oath to save the soil and decided to survive.

Spain's Soil Conservation Service publishes very easy-to-understand manuals explaining the different soil conservation methods that enable farmers to carry them out without having to resort to the Service. In case of more complicated conditions, a farmer or a group of neighboring farmers may apply for technical assistance through official regional or syndical organizations to the Service, which is under the Dirección de Agricultural, the top technical division within that Ministry in Madrid. Department 9, "Improvement of Agricultural Lands," has actual technical charge of all projects. A crew of technicians belonging to cooperating departments are mainly responsible for the conservation work.

The founding law declares that conservation works on farms are considered of public utility and national interest. Hence they must be cared for. In case of submarginal lands or of operations involving large expenditures that benefit other farms besides the one in which improvements are made, the Ministry of Agriculture will bear the costs either partially or entirely.

This fundamental soil conservation law was later supplemented with other legislative measures coordinating conservation works with forestation and reforestation projects on mountain slopes, watersheds and riversides, or with homesteading, dam protection to stop silting, defense against floods, etc.

Terraces on contour in olive plantation, Itnalloz, Granada Province, Spain.

Note:—The author is Chilean conservation writer.

Program Makes Rapid Strides

By R. Elizalde

As a general rule the most popular conservation measure is contour farming, due to Spain's many mountain chains and rugged territory. One of the main purposes of Spanish soil conservation is to lessen runoff damages caused by torrential blitz rains in central, south, and east Spain which wash away valuable minerals from the soil as well as topsoil.

The worst erosion in Spain is found in the Andalucian Provinces of Granada and Almería. There are regions there in which about 75 tons of soil an acre are lost a year.

At the same time there is much concern over the silting of Spain's costly dams. Extensive forestation works are being carried out in several sites, particularly at the Cubillas Dam in Almería. The Badajoz Plan undoubtedly is the greatest public works achievement in Spain. It consists of the regulation of the Guadiana River in the Province of Badajoz by a series of dams and many miles of canals and waterways. In short, it is Spain's own TVA, which has given preferential attention to good plant cover as the best possible guarantee for preservation.

The Soil Conservation Service publicizes the value of conservation through a small illustrated sheet entitled "Plaza Mayor," which features outstanding conservation success in Spanish farms. One issue features the "Pinedo" farm near the city of Toledo and the Tajo River. Each soil there has been put to its best use, either for wheat crops, olive groves, and woodlot improvements. To insure better results suitable terraces and roads were built. All these measures were carried out in 6 months at a cost of $4 an acre. It has been reported that since the farm was "conserved" in 1958, yields have increased by 100 percent.

From an economical viewpoint, the low cost of Spanish labor is a real incentive for widespread conservation. On 12 to 25 percent slopes, the cost per acre varies between 69¢ and 90¢, and paying up loans for conservation is made very easy. However, there are some drawbacks. For example, the use of machinery in Spain is far more difficult than in the United States, because of its very extensive rugged slopes which, due to Spain's limited available farming area, have to be plowed up. But even so there is a general trend for more ample machine use on farms needing them for conservation work.

Conservation education is a field which hardly has been touched upon. However, there is a very favorable disposition, both in educational and technical circles, towards it.

Population pressure in Spain, as in most countries, urges adoption of conservation measures. Only a small minority of farmers —those who own particularly good lands and can derive bigger profits if they care to practice conservation at a small cost—directly benefit with such measures. In general, benefits are indirect; because, for economic reasons, mounting costs call for expensive projects which can only be carried to effect at Government expense or aid. The implication is that conservation tends more and more to benefit a community rather than the individual. Conservation in Spain is thus practiced on a global scale, with massive forestation and reforestation on slopes and watersheds, with river course regulation, reclamation, irrigation and drainage projects, homesteading for

Conservation works on Almanzora watershed in Almería Province.

farming settlers on previously conserved land, integration of tiny farms to make of them marginal and economically operative units, etc. In short, conservation is the result of a many-sided national economic policy whose main goal is to insure survival to Spain's 31,000,000 people.

Although there is always room for improvement, officials like Minister of Agriculture Señor Cirilo Cánovas and his colleagues in other Ministries are successfully carrying out Cavestany's precepts to an extent that he wouldn't have dreamed of. Conservation in Spain not only means restoration but also survival, and worthwhile survival at that, because hopes are shining bright.

Author (left) studying soil survey program in India.

Soil Surveys Basic Throughout The World

By Charles E. Kellogg

SOIL scientists are travelers. Soils are out-of-doors and men must go to them. True, they make measurements of properties of soil samples indoors, even perform critical experiments with them, but these are only samples of parts of soils.

One can no more take a living soil into the laboratory than he can a river, a volcano, or a forest. A soil is a 3-dimensional piece of landscape with area and depth. It results from the combined actions of climate, vegetation, and animals acting on parent material, as conditioned by relief, over periods of time. Compounds are being added; others are being removed. Plants and animals are continually sorting the materials and concentrating some of them at the surface.

Soils formed by the same combinations of natural factors are alike. Changes in climate, volcanic eruptions or other natural catastrophies, and man's use of soil may improve it or may injure it for future use. Because of the intimate relationships between soils and their unique environments, the different kinds are not distributed promiscuously over the face of the world. And no one place has the same natural environment continously. One finds relics of the desert under the high trees of the rainy Tropics and relics of the Tropics under ice and snow.

A soil scientist working in a desert wants to know all he can about soils in other deserts. He wants to visit with the soil scientists working in the other deserts. And the same is true of a soil scientist working in any other environment. Because environments change, he needs to see as many typical examples of the great soil groups as possible. For example, studies in the Arctic and in the Tropics have helped us understand our soils of the South and the Midwest here in the United States.

No one can study everywhere in the world, and soil scientists must communicate freely among themselves. All the soil scientists of the world make a small group; yet each is likely to have professional associates and even close friends in several countries.

American soil scientists have taken part in these scientific exchanges since before 1900. For a long time, we received more than we gave; because many kinds of soil in the United States had been studied by scientists and used by farmers in other countries. Then, as our own experience grew, we developed concepts, skills, and methods in both basic and applied soil science that were of use elsewhere in the world.

Soil names like "Chernozem" and "Terra Rosa" suggest the international flavor of soil science. In this country, we now are well along toward a new system of soil classification that can include the results of research since before World War I. In this effort, we have exchanged visits, data, and correspondence with our colleagues overseas. In the process, all of us have learned a great deal about the soils of the world.

We in the United States have helped other countries get soil re-

Note:—The author is assistant administrator for soil survey, Soil Conservation Service, Washington, D. C.

search and soils surveys under way. In view of the fact that each country has its own unique set of problems, opportunities, and institutions, we have not put forward a "model." If each country had its most nearly ideal organization for soil surveys, related soil research, and soil interpretations and planning, no two of them would be alike. Success in soil surveying anywhere depends upon scientific direction, a staff of soil surveyors well grounded in the basic principles, facilities for applying those principles to clearly defined objectives, and a broad base of cooperation with other agricultural scientists.

The results are urgently needed in the newly developing countries, especially. Except for China, and possibly a few small countries in the semiarid regions, the soil and water resources of the undeveloped countries would be ample if they were reasonably well used. But the pattern of soils is complex. In the United States alone, we have more than 70,000 unique kinds of soil, with equally unique potentials for use. The total number for the world obviously is much larger. The greatest variety is in the Tropics; and most of the soils in the newly developing countries are tropical or subtropical.

Nearly all tropical soils require large amounts of fertilizer, in order for them to be productive for commercial food and fiber crops. But, equally important, are methods for water control, kinds and varieties of crops with the genetic potential to respond, and good schemes for plant protection. Soil scientists need to find out what combinations of practices give economic returns on each kind of soil to be developed into arable land.

Agriculture must emphasize the present skills of the people and contribute to the accumulation of capital for later stages in economic growth. The role of the soil scientist, in cooperation with others, includes two main initial activities.

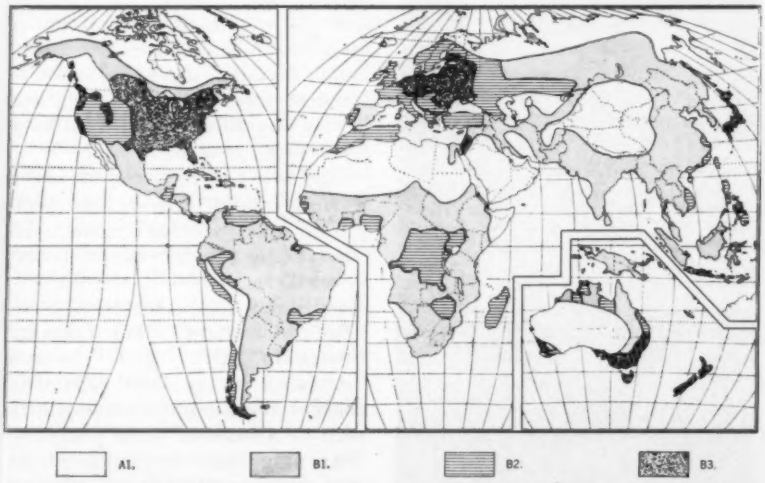
First: A schematic map of the soil resources of a country is needed. The first step toward it can be made in advance from study of the available data on soils and existing maps of climate, vegetation, geology, topography, and landforms. Air photos are useful for plotting tentative boundaries. In the field, the soil scientist describes and names the soils on this schematic map. He perfects the tentative boundaries among them. The final results, which can be had fairly soon, serve as a basis for general planning.

Phosphate-deficient soil in Ghana gives good response to phosphorous.

Second: For operational planning, detailed soil maps— at about 1:20,000—are needed of the areas selected for new development or for modernization. The maps must be detailed enough to indicate the potential of each potential field.

Two closely related activities go along with the soil survey: (1) Laboratory examination of the properties of the soil layers, including available plant nutrients; and (2) field testing of combinations of soil management practices. Then the soil survey gives a firm basis for setting forth the reasonable alternatives for each kind of soil, with the potential for its use.

The cultivator can be guided to soil and water management systems that give the highest long-time economic response for his labor and investment. Without such a soil survey the risks of new systems are greater than most can take.



A1—Areas relatively unimportant for agriculture. Existing soil maps generally of little or no use for agricultural interpretations.

B1—(B areas relatively important or potentially important for agriculture.) Existing soil maps generally of little or no use for agricultural interpretations.

B2—Soil maps mainly useful for broad agricultural interpretations at principal level.

B3—High proportion of soil maps, useful for moderately detailed agricultural interpretations at county level, are detailed or semidetailed and based largely on investigations.

From the Ends of the Earth—They Learn About Conservation and Americans

By Jackson Bennett

ON a Monday morning in June of 1955 a quiet man unobstrusively joined 23 other men already seated in a classroom at the University of Georgia. Gaston Noroña could be excused for being late, for he had traveled a long way—all the way from the Andes Mountain area of Ecuador.

Noroña was the first trainee from another country to attend a regular session at the Soil Conservation Service Training Center, established in 1954 to train Southeastern-based SCS employees how better to help farmers and ranchers get conservation on the land. Thirty-five other students from other countries have attended the Training Center as a part of a program of help to qualified foreign technicians through the Agency for International Development, formerly the International Cooperation Administration.

The usual work visit to this country of AID-sponsored technicians is for about a year. The Training Center sessions take up only 3 to 5 weeks of this time, but the training is eagerly sought by students in the know. For example, Feliciano Garcia, soil scientist from the Philippines, attended the first 2 days of a training session while he was visiting the SCS State office in Georgia. Recognizing the importance of the training, he obtained AID permission to stay for the entire 5 weeks' course.

The trainees have come from 16 countries, led by Indonesia with 6 Center "alumni." Brazil and the Phillipines have sent 5 each. Others have come from Bolivia, Cuba, Cambodia, Nationalist China, Ecuador, Honduras, India, Korea, southern Rhodesia, Spain, Thailand, Turkey, and Yugoslavia. The Yugoslavian representative, Mrs. Zlata Anacic, graduate in agricultural engineering at the University of Zagreb, has been the only woman to attend; but she entered into all the scheduled activities, including field problems in engineering and soil surveys.

Gaston B. Noroña (left) of Quito, Ecuador, and Roem Purnariska of Bangkok, Thailand, at Athens Training Center.

Antonio G. Gomez (center) of Brazil helps make soil survey.

What do these people from other parts of the world learn at the Center? Garcia put it this way:

"All of us who attend the Training Center are interested in soil and water conservation and the work of the Soil Conservation Service. The training we receive there provides us with a sharp picture of the integrated program of the Soil Conservation Service. We also go away with a new concept of the basic science of soil and water conservation.

"The foreign trainee has been trained as an agronomist, engineer, biologist, forester, soil scientist, or other agricultural specialist. At the Training Center, he learns how each of these sciences fits together like pieces of a jig-saw puzzle to form the applied science of conservation farming. And this is something that can be put to good use in the severely eroded countries from which most of us come."

And many of the technical skills learned by the trainees have been put to good use back home. An outstanding example can be found in southern Rhodesia. Harold Roy Hack, known to other trainees as "Bob," attended the Training Center in 1955. "Bob" became interested in the land capability concept and the soil and capability map as a basis of farm planning. Returning home to Salisbury, he was instrumental in starting a soil classification similar to the one he learned about at Athens. Now, land capability classes are shown on the soil survey maps in southern Rhodesia, too!

Laxman Pandit, from India, while a student at the University

Note:—The author is Training Center supervisor, Soil Conservation Service, Athens, Ga.

of Georgia last year, became greatly interested in the Training Center program. He would come by and sit in on many of the technical exercises. Some months after leaving Georgia, Pandit wrote that he had enrolled at another of the Service's training centers.

"I just had to attend one of your full courses before returning to India, he said. "It is just the kind of training I can put to practical use there."

Two of the early graduates, Hoemala Harahap of Indonesia and Manuel Singson of the Philippines, have been active in starting in their own countries technical programs of soil and water conservation based on the training received at the ATC.

While attending the Center, the trainees live together in a hotel, with those from other lands paired with trainees from the Southeast. Lasting friendships have been established in this manner. Chaitayna Patro of India observed of this aspect of the Training Center:

"I had really been misled about America and its people. After studying, working, and living with a group of 24 people from over the Southeast for 5 weeks, my concept of America has been radically changed. I've learned that America is really made up of people who are genuinely friendly and want to help us in other countries."

Soil Conservation Sticks In Taiwan and Burma

By Ira K. Landon

IN Taiwan the population is dense and the arable land is strictly limited in extent. These factors, along with the traditional Chinese veneration of the soil, cause the farmers of Taiwan to esteem their lands highly.

When the U. S. foreign aid program, working through the Joint Commission for Rural Reconstruction, offered technical and financial assistance in developing a soil conservation program in Taiwan, it was not surprising that the Taiwanese farmers responded wholeheartedly and readily accepted suggestions and ideas for conserving and improving their cultivated fields.

Starting from scratch in 1954, and working through and with the Provincial Department of Agriculture and Forestry, a soil conservation program suitable for Taiwan has been developed, local personnel have been trained, and an administrative organization has been set up in the Taiwan Provincial Government. These steps were similar to those employed in development of the Soil Conservation Service in the United States.

Soil conservation field offices were established in 16 hsiens (counties) in Taiwan, and in the watersheds of the major reservoirs. At each, a locally adapted program was worked out, and personnel were trained to apply and expand the program. Plots were established at research stations to

Bench terraces built by Kaosiung Hsien farmers after seeing work in Ah Keng Tien Soil Conservation Demonstration.

Note:—The author is former soil conservation adviser, Agency for International Development (formerly International Cooperation Administration).

measure soil and water losses under differing conditions. A personnel training center was established, and a training course in soil conersvation was organized.

After the need for some centralized coordinating agency became apparent, the scope of the work was broadened, with the advice of a committee of all interested agencies, to include the development of the agricultural and range resources of the mountain areas; and an organization pattern was drafted. A new agency was named the Mountain Agricultural Resources Development Bureau, but the major part of its work is conservation and watershed protection.

During the 7½ years that the U.S. foreign aid program employed a soil conservation adviser in Taiwan, a number of local technicians were sent to the United States for soil conservation training. This instruction added to the training and experience they received in Taiwan, and produced a corps of technicians who are capable of supervising and further developing the program in Taiwan without a great deal of outside assistance.

The soil conservation problems in Taiwan are accentuated by: (1) The cultivation of very steep slopes, because of the population pressure forcing the farmers up the hillsides, in order to produce the food and other raw materials needed by the expanding nation; (2) the torrential character of rainfall during typhoons; and (3) the small size of the individual land holdings and the intensity with which they must be cultivated.

Because of these factors, the terracing, striperopping, and crop rotation practices used in the United States do not provide adequate erosion control. The steep cultivated fields must be protected with level, bench-type terraces. Although expensive to build, they help prevent soil erosion, retain much of the water in the soil, and retain organic matter and plant nutrients that are washed off steep slopes. Waterways protected by vegetation or structures are used on all but the most permeable soils. On the latter, the water is retained by dikes until it percolates into the subsoil.

"V"-shaped drag being used to build bench terraces near Kangshan in Kaohsiung Hsien.

First use of Fresno scraper in building level bench terraces in Taiwan—Ah Keng Tien reservoir watershed, Kangshan.

Mechanization on a broad scale has not been feasible in Taiwan, because of the steep slopes, the small size of the individual fields, and the limited resources of the farmers. Bench construction and other earthmoving jobs usually are done by hand labor, or with Fresno scrapers and V-drags made in the local shops and drawn with the farmers' own cattle. Since these tools were introduced by the soil conservation adviser, the Joint Commission has provided hundreds of them to the field offices, where they are lent to farmers ready to work on their own lands.

A similar program was instituted in the Shan States of Burma in 1951; but this project, along with the entire Foreign Operations Administration program, was terminated in 1953 at the request of the Union of Burma. At the time, 12 young Burmese technicians were being trained in soil conservation techniques.

In May 1961, the same soil conservation adviser (the author, Ed.) returned to Burma on temporary assignment. He was gratified to find that 9 of the 12 soil conservation trainees were still doing soil conservation work. Two of the other 3 had been promoted to higher positions. The 3 pickup trucks which had been provided by U. S. aid funds in 1952 still were in operable condition after 7 years of use, and the surveying equipment was in first-class condition. Data had continued to be collected from the runoff plots established in 1952.

In consideration of the administrative changes within the government of the Union of Burma, and the fact that the soil conservation work had been discontinued prematurely, it was significant to note that the research work had been carried on and that the fieldwork was still in progress, even though on a limited scale.

With the incomplete program in Burma carrying on under Burmese direction, and with local resources and the Mountain Agricultural Resources Development Bureau now organized and staffed to carry on the program in Taiwan with local personnel, it is evident that U. S. aid funds expended on these programs are bearing fruit. They need further refinements, as do such programs everywhere. But, in that local men have received training, as a result of which they are going ahead to conserve their natural resources, the objective of the foreign aid program to help these peoples to help themselves, is being accomplished.

3 Ways To Conservation—

Canada—New Zealand—United States

By William R. Van Dersal

IT is widely recognized that natural resource conservation problems tend to be similar in character the world over. Soil, water, plants, animals, and the products deriving from them present problems in utilization combined with appropriate protection that are familiar wherever they may be found geographically.

Solutions to these problems must be technical, economic, and administrative. Technically, for example, we may not know how to save a vanishing species from extinction, even though a government is willing to spend money on it. Economically, we may not be able to afford action on a flood problem, even though we know how, and the government is willing. And, in many instances, we find that, despite technical competence and availability of funds, existing governmental mechanisms are unable to do the job.

Possibly the most rapid progress in soil and water conservation is being made where all three of these factors—technical, economic, and administrative—are favorable. That is, specifically, in the United States, New Zealand, and the province of Ontario, Canada. In all three, there is technical competence, economic feasibility, and an administrative or governmental mechanism peculiarly designed to meet the problems and get the job done. Not only are the administrative mechanisms similar; but, as a group, they differ markedly from mechanisms used in many other state, provincial, or national governments.

Note:—The author is assistant administrator for management, Soil Conservation Service, Washington, D. C.

The mechanisms include the soil and water conservation districts in the United States, the conservation authorities of Ontario (but not of other Canadian provinces), and the catchment districts of New Zealand. These three governmental or administrative mechanisms are similar in that they provide for local people to be essentially in full charge of their own local programs.

Each of them conducts its work with advice and help of federal and state (or provinical) agencies; but they are not merely local instruments for extending state, provincial, or federal programs. They do not serve in an advisory capacity to representatives of "higher-level" government agencies. On the contrary, the "higher-level" representatives serve in an advisory capacity to the district or authority.

Local agencies such as these correctly may be characterized as the closest approximation to a true natural resource conservation agency that has yet appeared in the world. In state and national governments, there usually are many agencies, each dealing with a single natural resource. The work of these agencies is not necessarily coordinated and, indeed, frequently may be competitive.

The soil and water conservation districts, the conservation authorities, and catchment districts so far are not compartmentalized or segmented. They must deal directly with problems involving soil, water, plants, and animals in an integrated way. They must attack and solve the whole problem. It is almost impossible for

Waian Valley on South Island, New Zealand, where control of rivers rushing some 60 miles from high mountains across the plain to the sea is required.

them to deal with a single resource; because the resources are too closely interrelated.

All of these three governmental agencies have proven notably successful. For example, studies indicate that the breadth of the program of Ontario's conservation authorities clearly is greater than that of districts in either New Zealand or the United States. Full attention has been given from the outset, not only to flood prevention, stream pollution abatement, and soil and water conservation, but also to a number of other related matters. Recreation has been given major consideration from the very beginning. So has wildlife conservation, which in this country has been given attention, but not necessarily in a primary way.

In addition, the conservation authority programs provide for the use of selected, purchased areas as community parks, for the preservation of important historical sites, the establishment of community forests, and, most remarkable of all, for the preservation and protection of natural biological areas of scientific value and interest. In contrast, recreation has been given little or no attention in New Zealand catchment districts. This has been true, also, in soil conservation districts in the United States until recently.

New Zealand districts, meanwhile, are beset by complex and difficult problems of wildlife control. There, for example, deer, elk, moose, kangaroos, and Canada geese are on what we would call the "vermin list," because of the increased numbers of these introduced animals; and New Zealanders accordingly have been more interested in reducing these wildlife populations than in increasing them.

Community parks and forests, and natural area preservation are still not a part of the district programs either in New Zealand or the United States, but community parks are quite likely to develop in the United States as a result of recently expanded interest in recreation, both by the public and the Government. Similarly, the preservation of historical sites seems to be entirely foreign to the thinking of both American and New Zealand districts, though in Ontario the dedication of such sites may be attended with considerable publicity. Also, most soil conservation districts in the United States have available historical information, and it is but a short step further to the preservation of more significant historical sites.

Perhaps breadth of program, as enabled in the laws, or as evidenced in the beginning works of the agencies, is really not in question. New Zealand catchment districts went to work first on river control, their worst and most difficult problem. They started work on the rivers, as authorized under their 1941 act; then in 1945 under an amendment to the original act, undertook the promotion of soil conservation. In 1955, New Zealand was still spending only 10 percent of its funds on soil consertion work, but this amount has increased steadily since.

In the United States, the reverse was true. The American soil conservation districts worked for many years on erosion control and land-use problems before flood prevention and watershed protection came into the picture. In Ontario, the earlier conservation authorities were formed in the first place because flood prevention was urgently needed. Soil conservation came soon, but not necessarily as a matter of primary emphasis.

In summary, it may be said that as their first-priority jobs have got under way, the agencies in all three countries have then begun to turn their attention to other phases of natural resource work. Powers being what they are under the enabling laws, it may be expected that a fully rounded program eventually should be a fact in all the three kinds of agencies.

Boy Scouts planting trees on 7,000-acre forest of Ganaraska River Conservation Authority in Ontario, Canada.

◆

The United Nations' Food and Agriculture Organization estimates that rodents, insects, and fungi destroy enough food every year to feed 250 million people for a year on a daily ration of about 2 pounds of cereal products.

Asia's Golden Rain Tree

Goes To College

By Melvin M. Thompson

Golden Rain Tree's new campus home.

A big Golden Rain Tree whose ancestors came from the Far East 2 centuries ago added new splendor to Washington University's campus in Missouri this summer. Set in the court area of the new John M. Olin library at the St. Louis institution, the tree will produce its yellow flowers each June for some 7,500 students. Its branches will push up to the third floor of the many-windowed library building, to be viewed perfectly either from the inside or out of doors.

The Golden Rain Tree (*Koelreuteria paniculata*) was introduced into the United States in 1763 from China, Korea, and Japan. When the Soil Conservation Service Plant Materials Center was established as a nursery at Elsberry, Mo., in 1934, a search was being made for plants to use on low fertility and severely eroded areas. Center Manager B. H. Slavin obtained Golden Rain Tree planting stock from the Department of Parks at Rochester, N. Y. The trees did well, and a colony of 30 to 40 trees was established.

In recent years a clump of the trees served as a seed orchard for the SCS. Seed was collected and propagated for trials in northern parts of the Cornbelt, to determine the value for wildlife and windbreaks, as part of the continuing search for better plants to meet a wide variety of conservation-planting needs.

The unique Oriental plant was the first choice of the landscape architect at the university, but the trees are so uncommon it appeared for a time that a substitution would be necessary. By a coincidence, the request came to the attention of Hugh S. Steavenson, a commercial nurseryman at Elsberry and former manager of the Plant Materials Center. At Steavenson's suggestion, university representatives visited the Center, where they found the very tree they wanted—a healthy specimen 35 feet tall. The State SCS office at Columbia approved the grant of the tree to Washington University.

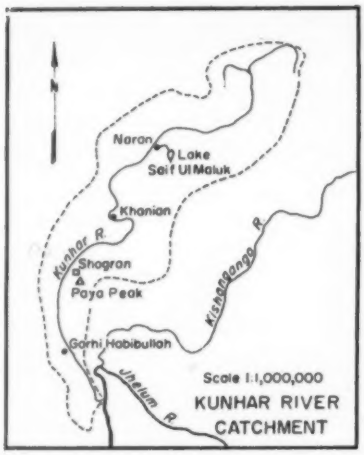
The Golden Rain Tree is representative of the variety of plant materials being tested at the Elsberry Plant Materials Center. SCS specialists go to the ends of the earth to find plants that will do a better job of protecting the Nation's land from wind and water damage. About 6,000 different species of grasses, legumes, forbs, shrubs, trees, and vines have been tested and observed on the 273-acre area during the last 10 to 15 years.

Two of the better known of these plants that have made good are multiflora rose, used for "living" hedges and wildlife plantings, and Elsberry smooth bromegrass, used in grass waterway and meadow seedings. The Center also has developed methods now used in many commercial nurseries. For example, a direct seeding method was developed for taprooted nut trees, as was a technique for planting.

Principal users of tested products from the Center are the many cooperators in soil and water conservation districts in the nine Cornbelt States it serves. Seed and other materials are collected from plant introduction centers, experiment stations, individual farms, and other sources. Trained technicians compare them, and the more promising selections are studied further in small plots before being used in actual field plantings in the area.

Golden Rain Tree grove.

Note:—The author is area conservationist, Soil Conservation Service, Fulton, Mo.



Snow Surveys In West Pakistan

By John E. Priest

A SNOW-SURVEY program was organized in 1960 for the 900-square mile Kunhar River catchment of the western Himalayas with Harza Engineering Company, International, assigned by the Water and Power Development Authority of West Pakistan to head up the program.

The Authority, known as WAPDA, is a semigovernmental agency formed to develop water resources for the country. Irrigation in West Pakistan is carried out annually on about 25 million acres. An organization dealing with water resources for such a vast area thus affects every member of the province of 40 million people.

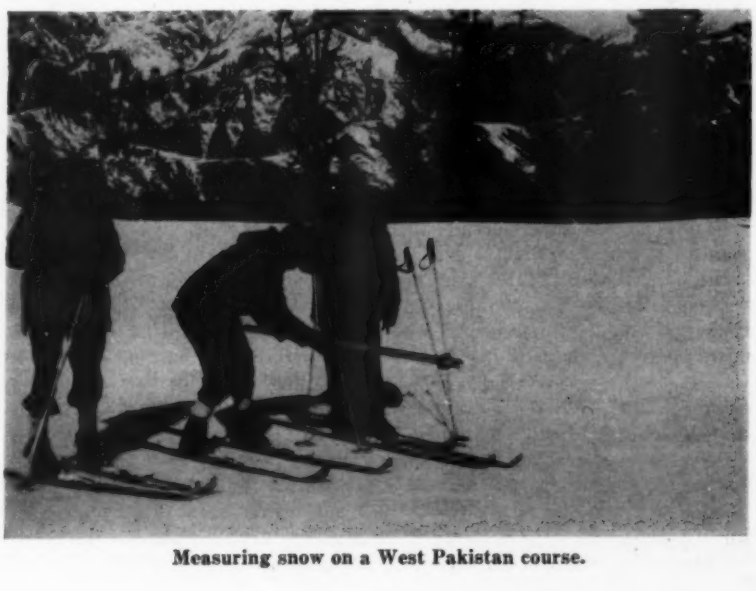
Immediate objectives in these surveys, patterned after the snow surveys made in the United States by the Soil Conservation Service and cooperating agencies and private interests, are limited to developing data for operating reservoirs and power installations in the Kunhar Valley and to training Pakistani engineers in snow-survey techniques. If this program is successful, it may be extended to permit forecasts of runoff for much greater downstream areas.

Greater use and control of water resources in West Pakistan was made necessary by the gigantic Indus Basin Settlement program, which also was entrusted to WAPDA.

In 1947, the subcontinent was divided into two nations—India and Pakistan—based on areas occupied by religious groups. The disposition of these groups had no relationship to geography. One of the most seriously affected areas was the land of the five rivers—the famous Punjab.

The irrigation system was intersected by the new national boundary, with control works and river headwaters lying in India and the commanded irrigation areas in Pakistan. It was apparent that each nation would require more autonomy in planning river development programs and carrying out the projects. Agreement was finally reached after years of negotiations carried on through the World Bank.

Conditions in most of the Indo-Pakistan subcontinent make it impossible to obtain a usable relationship of snow-water equivalent and stream runoff. When Dr. J. E. Church, a pioneer in the United States snow-survey program, visited India in 1947 to help establish a program there, he found that low latitude and east-west orientation of the mountain barrier caused snow to accumulate above elevations of 12,000 to 14,000 feet. Snow courses had to be set up at these extremely high altitudes. But the ratio of monsoon to snowmelt runoff proved to be so great that influence of the snowmelt was marked. India aban-



Measuring snow on a West Pakistan course.

Note:—The author is hydrologist, Harza Engineering Co., Intl., Chicago, Ill., assigned to Lahore, West Pakistan.

doned attempts at making water equivalent snow surveys about a decade ago.

None of the factors which limited the Indian venture into snow surveying appear to be significant, however, in the Kunhar River catchment in Pakistan. The survey area of Pakistan is in a narrow, V-shaped valley of the western Himalayas. The valley is shielded greatly from the heavy monsoon rains which hit the Punjab and foothill areas from July to September. Winter storms deposit several feet of snow on the catchment.

Snow courses consist of two sets—one of five courses and one of four—separated by about 30 miles. Courses vary from 7,750 to 10,600 feet high. Fiberglass soil-moisture units have been installed at each course. Other equipment at various courses includes precipitation and storage gages. Summer rest houses near the bottom of each set are used during the surveys by crews. In each area, the top three courses are surveyed in 1 day—a round trip of 10 miles and a climb of 3,000 feet.

Seven Pakastani engineers, all employees of WAPDA, were trained in 1961 and 1962. These engineers are from the hot plains. Snow was unknown to them; but they adapted to cold weather work with relative ease. All are volunteers from the Surface Water Circle of WAPDA, which has responsibility for collection of hydrologic data in West Pakistan.

Three surveys were carried out in the Kunhar valley in 1961, and five in 1962. At times, the parties were 2 days from their motor transport, as the valley was snowbound in higher reaches. It was necessary to travel about 60 snowy miles, sometimes by walking and at other times by skiing. Soil-moisture and precipitation data also were collected at the snow courses in 1962; and streamflow measurement will be continued at three river-gaging stations in operation since 1960.

Snow surveys should be practicable and desirable in the Kunhar catchment, although several more years of collecting data are needed to confirm this. The present surveys also provide valuable training. Several other small catchments in northern Pakistan may also have requisite conditions for successful snow surveys. A long-term objective in this snow-survey program will be to explore the possibility of using snow-survey data for operation of the new Mangla Reservoir on the Jhelum River.

A HISTORY OF LAND USE IN ARID REGIONS. Edited by L. Dudley Stamp. 388 pp. 1961. United Nations Educational, Scientific, and Cultural Organization (UNESCO).: Paris, France. (UNESCO Publication Center, N. Y.) $10.50.

This large book is the 17th document issued by UNESCO in its Arid Zone Research Program. The preceding volumes dealt mainly with the scientific aspects of improving future agricultural production and human welfare in the arid and semiarid regions of the world. This volume is devoted chiefly to the history of past land use in these regions and the possible effects that past use may have on future use of these lands.

The book was written by 16 distinguished authors, with introductory and concluding chapters by the editor.

The arid zones of the world are divided in principal regions for purposes of the discussions: Southwestern Asia, India and Pakistan, Central Asia, Egypt, North Africa, the Sahara, South Africa, Southwest Africa, Australia, and the western United States, each being given a chapter. There is a chapter about Pre-Columbian Central and South America; but, apparently, the chapter about Post-Columbian Central and South America failed to get to the editor in time for inclusion. In addition, there are chapters about: The Causation of Arid Zones; Climatic Change in Arid Regions Since the Pliocene; and Public Health Problems of Arid Lands.

This is perhaps the most comprehensive study ever made about the history of land use in arid regions of the entire world. It contains a wealth of information for the student of past and present land use in these regions. Moreover, the authors give detailed bibliographies at the end of each chapter for those who wish to pursue the studies further.

There is considerable discussion about irrigation methods and dry-farming methods, as well as of grazing and deforestation practices and their effects.

This reveiwer commends the book to those who wish to make a study of these matters, but it is not suited for light reading.

—Tom Dale

Have You Seen?....

● "The Big Conservation Job Is on Private Land," USDA's Picture Story 142. As the pamphlet illustrates, research, education, and technical and financial aid are the keystones of the Department's conservation programs carried on in cooperation with owners and operators of the Nation's preponderantly private land area.

GOVERNMENT PRINTING OFFICE
DIVISION OF PUBLIC DOCUMENTS
WASHINGTON 25, D. C.

OFFICIAL BUSINESS

PUBLIC LIBRARY
AUG. 15 1962
DETROIT

PENALTY FOR PRIVATE USE TO AVOID
PAYMENT OF POSTAGE, $300
(GPO)

If your address changes, please notify us of your complete new address, including zone or RFD number, and include old address with our code number as shown above.

WORLD FOOD FORUM

(The World Food Forum commemorating the Centennial of the U. S. Department of Agriculture was held in Washington, D. C., May 15-17, 1962. A few representative quotations from papers presented at the Forum reflect the attention given to the importance of agricultural resource conservation in improving and sustaining world food production.—Ed.)

Secretary of Agriculture Orville L. Freeman: "In an underdeveloped agriculture the incentive of ownership is a powerful mechanism for the creation of capital from labor by such means as digging wells and ditches, clearing land, building roads or terraces or buildings and rearing livestock. Underemployed labor is thus transformed into capital assets. This impetus to productivity is not achieved where the farmer lacks the pride of ownership and the opportunity for gain from his added effort."

Paul G. Hoffman, Managing Director, United Nations Special Fund: "Physical and human resources are available in almost all the low income countries to bring to the peoples of those countries lives of decency and dignity. With every passing day at the United Nations new evidence comes to light of the enormous potentialities in the form of physical resources, of great rivers whose waters are hardly being used, of tremendous forests that have never been inventoried, of mineral wealth that has never been tapped. Particularly impressive are the little used agricultural resources of these countries."

Henry A. Wallace, Former Vice President and Secretary of Agriculture: "When we learn how to develop our human relations as we have developed our agricultural productive capacity, when we learn how to retain the best traditions of our farms in an increasingly urbanized society, when we learn anew how to fire ourselves and our youth with a sense of moral responsibility and of purpose, then we will invent even newer techniques and build the new institutions needed in a hungry world threatened with self destruction."

Frank W. Notestein, President, The Population Council, Inc.: "The only hope that all men can secure adequate health, education, and relief from poverty lies in escape from a self-sufficient peasant agriculture. We must rely on modern technological knowledge and a sophisticated use of resources. Men cannot, otherwise, obtain a decent livelihood even for the present population—to say nothing of the much larger populations of the near future."

U.S. Senator Stuart Symington of Missouri: "The fertile soil of our country in the hands of our efficient and ingenious farmers has created a productive capacity which is and will continue to be an effective ingredient of our foreign policy . . . American agriculture has set an example which if followed and adapted to the peculiar requirements of the underdeveloped nations, will be a potent force for achieving the age old goal of eliminating hunger from the world. This in turn will be no small contribution to the achievement of a more rational and, it is to be hoped, a more peaceful world."

Sir John Crawford, Director, Research School of Pacific Studies, Australian National University: "I want to suggest that during the next 40 years there will be a major food problem in the world and that the solution to it must be found during the first or, at best the first two, of these four decades. . . . I venture to suggest that just as the U. S. has given so freely to the world from its century of research and technological advance in agriculture, it must, during the next 10 years, lead and encourage all other Governments willing to work with it towards a world food policy."